Wetlands for the World: Canada's Ramsar Sites

D.I. Gillespie, H. Boyd, and P. Logan

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Wetlands for the World:

Canada's Ramsar Sites

The Convention on Wetlands of International Importance Especially as Waterfowl Habitat (The Ramsar Convention)

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Great Blue Heron
(G.W. Beyersbergen)

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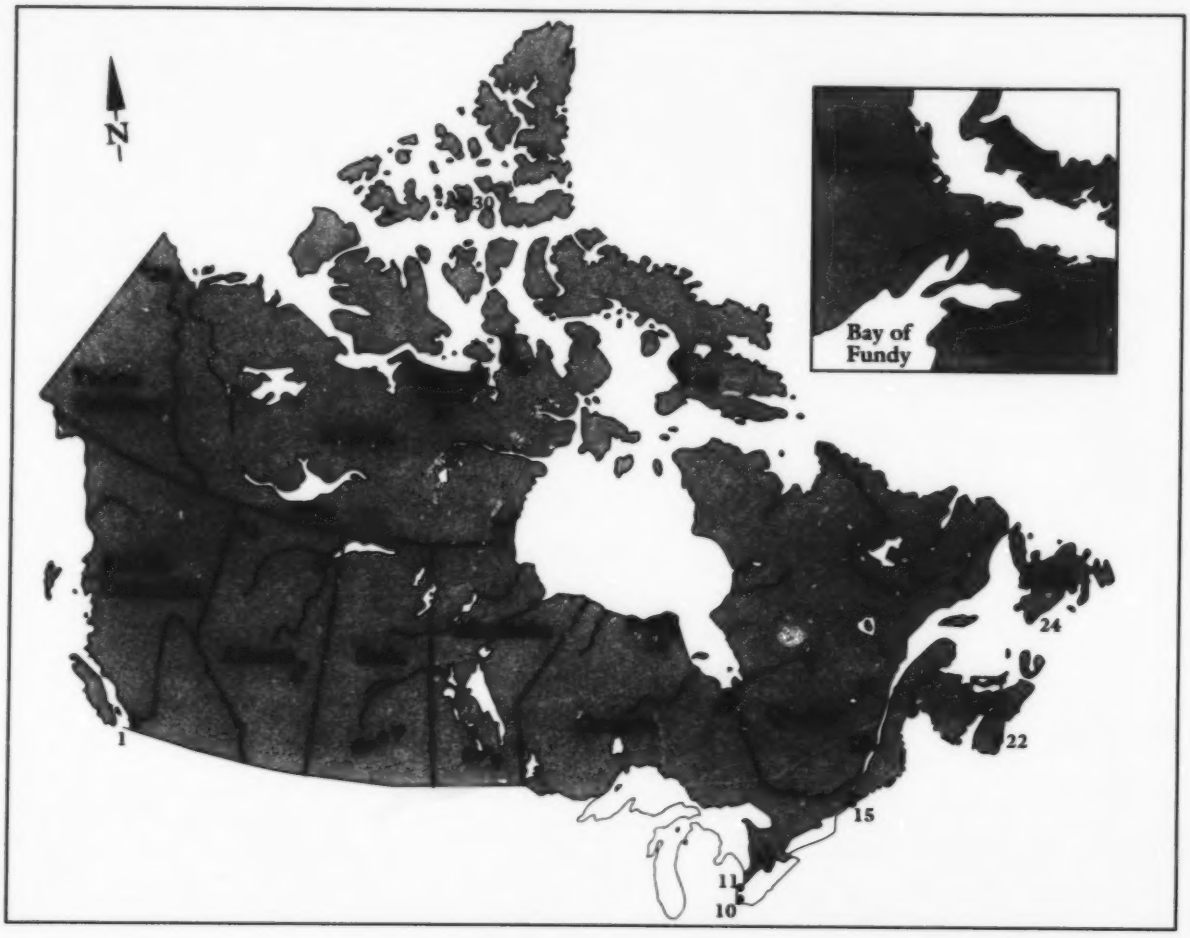

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Introduction

Wetlands are among the most productive life-support systems in the world. They are permanent homes for a vast array of animal and plant life and vital temporary habitats during the biological cycles of hundreds of migratory species. They provide us with oxygen, fish, shellfish, waterfowl, mammals and other wildlife, fibres, food, and other useful materials. They dilute, break down, and detoxify a wide range of human wastes, store groundwater and recharge aquifers, and protect land areas from wave and water erosion. Wetlands add variety and aesthetic interest to the landscape, provide recreational opportunities, and are sites for education and research.

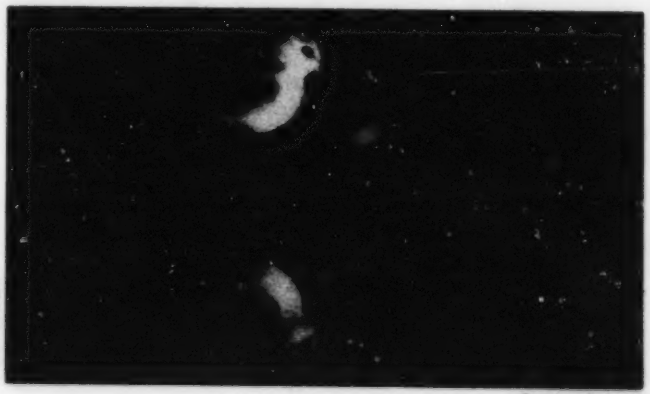
Wetlands include marshes, swamps, bogs, fens, and areas of open water, such as potholes and ponds. They may be artificial or temporary, and their water may be fresh, brackish, or salt.

Unfortunately, many people still treat Canada's marshes, swamps, bogs, fens, and potholes as wastelands. Wetlands are being destroyed or damaged by the draining of marshes, impounding of rivers and streams, diking of floodplains, and filling-in of shallow-water areas. The loss of wetlands affects future generations as well as our own. The farmer who tiles or ditches his land to remove standing water may not be aware of the resulting increase in the sediment load in an adjacent stream and the smothering of aquatic life or the lowering of the groundwater table. The cottager who removes the "weeds" in front of his cottage may not realize that he is destroying a spawning area that supports fish he and his friends may hope to catch.

The Ramsar Convention

Wetlands are imperilled not only in Canada but around the world. In 1971, at the invitation of the Iranian government, representatives of eighteen countries and several international organizations concerned about the alarming extent of wetland losses throughout the world met in the town of Ramsar to draft the Convention on Wetlands of International Importance Especially as Waterfowl Habitat. One major objective of the convention was "to stem the progressive encroachment on and loss of wetlands, now and in the future." The convention, which has become known as the Ramsar Convention, came into force on December 21, 1975.

The intention of the founding countries was to draw international attention to serious threats to wetlands recognized to be of international importance. Under the convention, contracting parties must designate one or more sites to be included in the List of Wetlands of International Importance (the "list"). Sites may be designated because of their ecological, botanical, zoological, limnological, or hydrological significance. The convention is



Robert McCaw

Semi-palmated Sandpiper

intended to support, not override, the legislation of provincial, state, or federal governments. It emphasizes the concept of "wise use," which means using a wetland in ways that are compatible with and sustain its natural properties. The only restriction the convention places on the management of a wetland included in the list is that permitted activities should not alter or destroy the ecological character of the wetland. The designation of an area as a Ramsar site is one means of ensuring that the potential hazards of proposed development are thoroughly examined and that all possible remedies or measures meant to reduce the impacts are fully explored, properly designed, and put in place *before* any change in status occurs, rather than after. The list is now maintained by the World Conservation Monitoring Centre of the International Union for Conservation of Nature and Natural Resources. By year-end 1990, sixty countries had signed the convention, and 488 sites, covering an area of more than 30 million ha, had been included in the list.

Canada and the Ramsar Convention

The official title of the Ramsar Convention has a clumsy look, because of the phrase "especially as waterfowl habitat" tacked on at the end. Because most waterfowl are migratory, spending different parts of the year in different countries, that awkward appendage helps to emphasize the need for wetlands to be managed throughout the world. Waterfowl that breed in Canada winter in, or pass through, many other countries. Most of them go to the USA, but many go farther: to Mexico, Central and South America, western Europe and northwest Africa, and a few even to northeastern Asia. This gives Canadians an interest in other peoples' wetlands, as well as their own. The need to protect waterfowl habitat remains one of the key reasons for the Ramsar Convention.

In January 1981, Canada became the twenty-ninth signatory to the Ramsar Convention and identified the Cap Tourmente National Wildlife Area in Quebec as its first addition to the List of Wetlands of International Importance. The Canadian Wildlife Service of Environment Canada carries out the obligations of the convention for Canada. In cooperation with the provinces and territories, Canada is responsible for identifying and describing sites worthy for inclusion in the list and ensuring that they are given adequate legislative protection. Between 1981 and 1988 Canada, with provincial and territorial cooperation, designated 30 wetlands covering 12.9 million ha, by far the largest area yet declared by any member state.

The Protection of Wetlands in Canada

Whereas Canada's involvement in international wetland conservation began relatively recently, concern about wetland protection at home dates back more than a century. Canada has the longest coastline of any country in the world (243 000 km) and numerous estuaries. About 14% of Canada's total area of 997.6 million ha is wetlands, the majority located north of 60°N. Most of Canada was covered with ice 9000–10 000 years ago. As the ice sheet retreated north, hundreds of thousands of ponds, rivers, and streams with their associated wetlands were formed. They contain 15% of the world's fresh water. In the north this massive heritage of freshwater, brackish, and saltwater wetlands is still little touched by human activities.

In the more settled and developed parts of southern Canada, however, the situation is very different. The destruction and deterioration of wetlands has been, and continues to be, widespread and rapid. A hundred years ago it was foreseen that the advance of European-style settlement would lead to losses of waterfowl habitat. In 1887, the Lieutenant-Governor of the Northwest Territories (present-day western Canada) recommended that the islands and shoreline property at the north end of Long Lake (now known as Last Mountain Lake in the Province of Saskatchewan), should be set aside to preserve breeding grounds for a wide variety of waterfowl. North America's first refuge for waterfowl was established on June 8, 1887.

Following the signing in 1916 of the Migratory Birds Convention, a treaty between the United States and Great Britain on behalf of Canada, the Canadian Parliament passed the Migratory Birds Convention Act in 1917 to protect migratory birds and their eggs and nests. In 1920, the first Migratory Bird Sanctuaries were established under the act to protect critical habitat. One hundred sanctuaries, administered by the Canadian Wildlife Service, are now in existence, covering a total of about 11.3 million ha. This is 1.1% of the area of Canada, or more than twice the area of Nova Scotia. Sanctuaries have been established on federal crown land, especially in the Northwest Territories, on provincial crown land, and, less frequently, on privately owned land.

In the 1960s the destruction and degradation of wetlands in the settled portions of southern Canada was accelerating at an alarming rate. The Migratory Bird Sanctuary Regulations, which are intended to protect birds, could not be extended to protect wetlands and other habitats. The Canada Wildlife Act was enacted in 1973 to allow the federal government to acquire key areas through purchase, donation, or lease for conservation, research, or interpretation purposes. The Canadian Wildlife Service's network of National Wildlife Areas was established under this legislation. It now includes 45 areas, covering about 290 000 ha. The Canada Wildlife Act also encourages cooperation between the federal, provincial, and territorial governments in programs to protect wetlands.

Government departments are not necessarily the most suitable agencies for acquiring and managing wetlands. There are important roles for non-government organizations, such as the Nature Conservancy of Canada and Ducks Unlimited Canada, which can assist private landowners more easily and act more flexibly than government can. Recognizing the merits of non-government action in habitat conservation, in 1985 the federal government created an autonomous body known as Wildlife Habitat Canada to enlarge the scope and scale of such conservation activities. Much of the core funding of the new organization is provided by the proceeds of the sale of Wildlife Habitat stamps, which must be brought by hunters when they obtain their annual Migratory Game Bird Hunting Permit and which are also bought by other members of the public who are interested in wildlife conservation. Wildlife Habitat Canada helps in the acquisition of land to be managed for wildlife by other organizations, encourages habitat surveys, and promotes research on habitat problems and management techniques.

Canada's Ramsar Sites

Canada has 30 Ramsar sites from coast to coast, in all ten provinces and both territories. Some sites attract migrating birds in spectacular congregations; others protect rarely found habitats where certain species can breed undisturbed. Some are remote and may be visited only by permit, whereas others welcome the general public with interpretation centres and trails. The importance of many sites for waterfowl conservation was recognized early on: a considerable number of them had already been designated as parks, Migratory Bird Sanctuaries, or National Wildlife Areas.

The sites are shown on the map (page 4) and described in order starting on the west coast.

Alaksen National Wildlife Area

British Columbia's Fraser River delta is the most important stretch of shoreline for wildlife, especially birds, on Canada's west coast. The Alaksen Ramsar site is part of the delta, situated at the northern end of Westham Island about 35 km south of Vancouver.

G.W. Beyersbergen

Lesser Snow Geese

The Fraser River estuary is an important link in the chain of bird habitats between breeding grounds in Canada, Alaska, and the eastern USSR and wintering grounds in the southern USA and Central and South America. In winter, it supports the highest densities of waterbirds, shorebirds, and raptors in Canada. The water levels of the Fraser River fluctuate a great deal, rising considerably in the spring and early summer during snowmelt. The larger islands of the delta provide tidal marshes, in which sedges and cattail predominate, marshy meadows of grasses and sedges, and peat bogs dominated by Labrador tea and hardhack.

Up to 40 000 of the Lesser Snow Geese that breed on Wrangel Island, a Soviet possession off northeastern Siberia, roost and feed on the estuary from October to March. The Wrangel Island snow geese split into two distinct flocks during fall migration. One flock winters in California and the other on the Fraser delta and the Skagit River in Washington State. In fall and spring most of the northern geese are on the Fraser, using the Alaksen site both as a roost and their chief feeding place. In January and February almost all the geese move to the Skagit.

The duck population in the Fraser River estuary builds up gradually beginning in the early fall, peaks from late October to December, and then declines from January to April. Maximum numbers of ducks have been observed in November, when more than 220 000 have been recorded. In the early fall the American Wigeon is the most numerous duck. By the second half of October the Mallard, Northern Pintail, Green-

winged Teal, and Greater Scaup are also common. During the summer the Surf Scoter is the most abundant duck: in late July and early August as many as 10 000 are feeding on the tidal flats.

Shorebirds winter throughout the estuary. Up to one million shorebirds of 24 species feed and rest on the estuary between July and November. The second largest gull population on the west coast is also found on the delta, sometimes numbering over 70 000 birds.

The Alaksen site is subject to the pressures of major urban-industrial developments. More than one million people live in the Fraser River valley, exerting a considerable influence on the delta, including Alaksen and its associated bird life. Land development has steadily reduced the amount and quality of the delta for wildlife.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Alaksen National Wildlife Area 1982	British Columbia 49°06′N; 123°10′W.	520	Federal, Provincial	Uplands, freshwater wetlands, and tidal zone wetlands; part of the Fraser River Coastal Estuary.	Migratory Bird Sanctuary, B.C. Game Reserve	Visitor centre operated by B.C. Waterfowl Society.

Beaverhill Lake

Beaverhill Lake, in central Alberta, is a broad, shallow lake set in gently rolling countryside that also holds many smaller bodies of water, known locally as sloughs. This provincially protected wildlife area is important both as a breeding place and as a staging area for migrant birds. Over 250 species of birds have been recorded here, 145 being known to have nested. There are colonies of White Pelicans and Double-crested Cormorants, both scarce in the prairie provinces, and many nesting ducks and other waterbirds.

Spectacular numbers of waterfowl and shorebirds are seen here on migration, especially in the fall, when more than 200 000 ducks, geese, and swans have been recorded at one time. During the drought years of the 1980s the numbers were fewer, though Beaverhill Lake is far enough north to have escaped the worst effects of the drought, during which the duck breeding population of southern Alberta fell from 6.5 million in 1975 to 2.5 million in 1989. Much of the loss was due to the destruction of ponds and nesting cover by intensive farming, rather than to shortage of water, and the return of wetter conditions may not lead to a restoration of the former

abundance of ducks. Beaverhill Lake and other protected areas in which farming is not the dominant concern are of special importance in times of scarcity. They may also serve as

- models for benign management of the parklands, formerly a mix of water, grasslands, and woods, that have been bulldozed clear in the last 30 years.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Beaverhill Lake 1987	Alberta 53°30′N; 113°30′W.	18 050	Provincial	Flat to gently rolling area that includes an abundance of sloughs. The lake is broad and shallow.	–	Trail.

Peace-Athabasca Delta

The Peace-Athabasca is one of the largest freshwater deltas in the world, covering an area of more than 320 000 ha. Most of the delta lies in Wood Buffalo National Park. It actually consists of three deltas, those of the Athabasca, Peace, and Birch rivers (in descending order of size). Its four major lakes are very shallow, from 0.5 to 3 m deep, and are characterized by thick growths of submergent and emergent vegetation.

G.W. Beyersbergen

Northern Pintails

Active and inactive river channels meander across the delta joining the four lakes to Lake Athabasca. The large open grasslands are interspersed with hundreds of perched basins, which create thousands of kilometres of shoreline ideal for waterfowl production.

The delta is one of the most important waterfowl nesting, resting, and feeding areas in North America. It provides a vital spring resting and feeding area for breeding ducks and geese on their way north to the Mackenzie River lowlands, the Arctic river deltas, and the Arctic islands. The shallow water, high fertility, and relatively long growing season of the delta produce the abundance of food these birds require. During drought years on the prairies, when a large proportion of the duck population is forced to move to northern habitats, the productivity of the delta is of particular significance. Up to 400 000 waterfowl rest and feed on the delta during spring migration and over one million during fall migration. Total breeding duck populations have been as high as about 160 000 pairs in the 1980s, consisting of 120 000 pairs of dabbling

ducks and 40 000 pairs of diving ducks. There had been twice as many in the late 1950s and early 1960s.

The Canada Goose, Mallard, Gadwall, American Wigeon, Northern Pintail, Green-winged Teal, Blue-winged Teal, and Northern Shoveler breed on the delta: 215 species of birds, including the threatened Peregrine Falcon and the endangered Whooping Crane, and 44 species of mammals have been recorded. Wood bison, a threatened species, graze on the delta meadows. Their numbers have fluctuated, recently averaging about 10 000 animals.

In the recent past, a major threat to the delta was the construction of the W.A.C. Bennett Dam, over 800 km upstream on the Peace River in British Columbia. Completed in the late 1960s, the dam has greatly reduced the delta's productivity. As a consequence of the impoundment of water in Williston Lake above the dam, flood flows on the Peace River are now controlled, and the Peace no longer provides a natural barrier to the outflow of water from Lake Athabasca. With the changed flow regime in the Peace River, water now flows out of Lake Athabasca much more rapidly than it used to and the lake fails to rise to its former levels. The productivity of the perched basins is dependent on water levels rising during the spring and summer and then receding during fall and winter. The disruption of this cycle has led to significant changes in the distribution of the major plant communities and in the associated invertebrate and waterfowl populations. In order to mitigate the effects of the new water level regime, two weirs on tributaries to the Peace River were constructed in 1976. The weirs have nearly restored the natural summer peak water levels of the delta, though the amplitude of seasonal and annual water level fluctuations is still less than under the natural regime. This improvement caused the numbers of ducks, which had fallen to little more than 200 000 in the mid-1970s, to increase to nearly 400 000 by 1980. Since then, though there have been wide fluctuations from year to year, the average population has exceeded 300 000.

The W.A.C. Bennett Dam was followed by a second dam on the British Columbia section of the Peace River, the Peace Canyon Dam, which further altered the annual flow cycle of the river. In 1991 the British Columbia Hydro and Power Authority was refused permission to build a third dam on the river, below Fort St. John (about 750 km upstream of the delta), which presumably would have altered the flow regime yet again. Another potential hazard lies in the increased flow of pollutants that will follow the completion, late in 1991, of a new pulp mill on a tributary of the Peace River, at Chetwynd, B.C. Other pulp mills are planned in northern Alberta..

Most of the delta lies within Wood Buffalo National Park and is therefore protected by the National

Parks Act. That protection is limited to activities within the park boundaries. The effects of the dams built in another jurisdiction upstream provide a striking example of the obstacles to wetland protection on a large scale.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Peace-Athabasca Delta 1982	Alberta 58°42′N; 111°08′W.	321 200	Federal, Provincial	One of largest freshwater deltas in the world, with shallow lakes and large open grasslands interspersed with hundreds of perched basins.	Most of delta lies in Wood Buffalo National Park.	Accessible only by air or boat. No visitor facilities.

Hay-Zama Lakes

The Alberta government has protected a large lowland area to the north and west of the Peace River that includes a series of eutrophic lakes, floodplains, and river deltas which hold large numbers of ducks and geese during the spring and fall migrations. Up to 130 000 Lesser Snow Geese, 47 000 Canada Geese, and 200 000 ducks (mostly dabbling ducks) have been recorded here during the fall migration. This region is less important for breeding waterfowl than the Peace-Athabasca delta (450 km to the east), but has the advantage of not having been subjected to great man-made changes in its hydrological regime. The only potential threat to the area seems to be the likelihood of increased exploration for and development of oil and gas reserves. With careful management those activities need not cause serious harm to wetlands.

The lakes and wetlands of northern Alberta lie in roughly the same latitude as southern Finland and the Baltic states and are of comparable importance as staging and breeding areas for migrant ducks and geese. They are less well known, chiefly because the human population of northern Alberta is small and has not, as yet, greatly modified the landscape or its wetlands.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Hay-Zama Lakes 1982	Alberta 58°30′N; 119°00′W.	50 000	Provincial	Freshwater eutrophic lakes, floodplains, and interior river deltas.	–	Accessible by boat. No visitor facilities.

Whooping Crane Summer Range

As its name suggests, this Ramsar site, mostly lying within the boundaries of Wood Buffalo National Park, is of unique importance as the only nesting area of the endangered Whooping Crane.

When, after much searching, the breeding place was found in 1954, there were only about 4 nesting pairs. By 1989 the number of breeding pairs had risen to 31, producing 20 young birds.

The area is a massive complex of thousands of more or less continuous waterbodies, varying in depth in summer from a few centimetres to one metre. It lies near the northern limit of the boreal forest and west of the Canadian Shield. It is relatively little used by other waterbirds, its biological productivity being low. Each pair of Whooping Cranes requires an extensive territory to ensure that a single chick can be reared.

Some years ago much of the Summer Range became unusually dry, threatening the well-being of the cranes not only by reducing the numbers of amphibia and invertebrates on which the cranes feed but also by making it easier for wolves and other predatory mammals to move about in the normally waterlogged terrain. There were fears that the lowering of the water table might have been due in part to the demands for water of an industrial development at Pine Point, north of the park, though the connection was not demonstrated beyond doubt.

Dalton Muir

Whooping Crane

The operation has been closed down, and the Summer Range is again wet. It is slowly being recognized that the western boreal region is affected by major fluctuations in precipitation, with consequential changes in water levels, similar to, though much less spectacular than, those in the parklands and former prairie grasslands to the south. Thus it cannot be taken for granted that the Summer Range will always remain a suitable home for the Whooping Crane. The possible effects of climate warming from the "greenhouse effect" are even harder to predict here than in other regions of North America.

The second crucial area for the survival of Whooping Cranes is on the coast of Texas, where they winter, mainly in the Aransas National Wildlife Refuge, itself an American Ramsar site. Under the U.S. Whooping Crane Recovery Plan many attempts have been made to identify key migratory staging areas used by the cranes. Whooping Cranes stop in

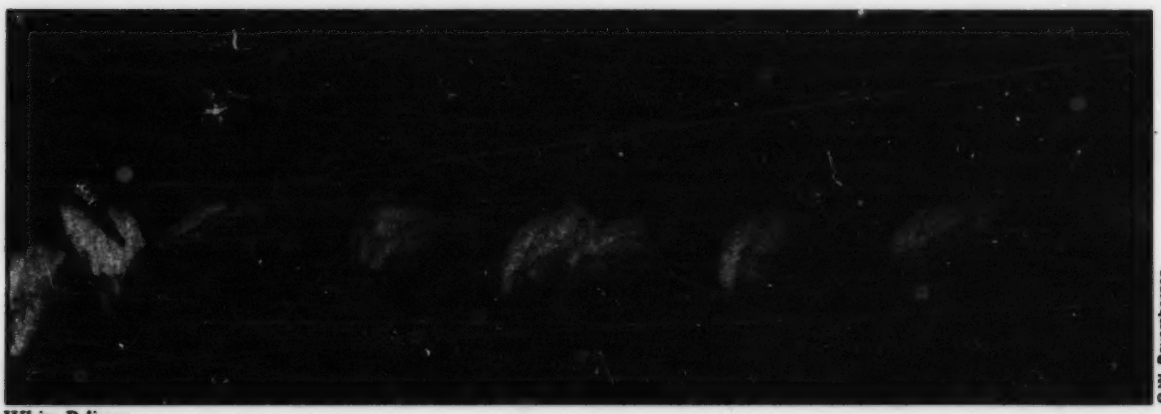
southern Canada, especially in Saskatchewan, but, although pairs and family groups show remarkable fidelity to particular stopping places, they disperse themselves so widely that it seems impracticable to protect those sites, except where they also happen to be important for other waterfowl, as at Last Mountain Lake (below).

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Whooping Crane Summer Range 1982	Alberta, Northwest Territories 60°15′N; 113°15′W.	1 689 500	Federal, Provincial	A complex of thousands of waterbodies varying in depth from a few centimetres to a metre.	International Biological Programme site	No public access.

Last Mountain Lake Migratory Bird Sanctuary

Last Mountain Lake is the oldest waterfowl refuge in North America. It was established in 1887 to protect about 1000 ha of breeding grounds for "Wild Fowl." In 1921 it was declared a Migratory Bird Sanctuary and in 1982 a Ramsar site. The site, at the north end of the lake, contains shallow marshy bays and inlets separated by numerous points and islands. The surrounding uplands contain potholes with fresh and saline wetlands.

Last Mountain Lake and the surrounding uplands are a major resting and feeding area for waterfowl and Sandhill Cranes during spring and fall migration. Concentrations are greatest from mid-August to November, when up to 75 000 cranes and 400 000 geese may be present. Over 260 bird species have been recorded on the area and at least 100 are known to have nested, including the endangered Piping Plover. The Whooping Crane, another endangered species, has been seen several times during spring and fall migrations. Colonially nesting birds that nest on the islands in the lake include the Double-crested Cormorant, Ring-billed and California gulls, and Common, Forster's and Caspian terns. Other breeding waterbirds include Red-necked, Eared, Pied-billed and Western grebes; Black-



D.M. Reynolds

White Pelicans

crowned Night Herons; and a variety of prairie shorebirds including Avocets, Marbled Godwits, Willets, and Wilson's Phalaropes. Large numbers of White Pelicans use the area each summer. The Sharp-tailed Grouse and Hungarian Partridge are year-round residents on the uplands.

In addition to birds, this Ramsar site supports populations of prairie mammals including red fox, badger, coyote, jack rabbit, and white-tailed deer. The area provides critical wintering habitat for the deer. The wetlands that border the lake and shallow bays and inlets are also important as fish spawning and nursery areas. Last Mountain Lake is said to support the most productive fish population in the province.

The only apparent threat to the area is the growing increase in recreational use by the general public, which will have to be carefully monitored and guided to avoid damage to some of the habitats.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Last Mountain Lake Migratory Bird Sanctuary 1982	Saskatchewan 51°20'N; 105°15'W.	15 602	Federal	Lake with shallow marshy bays and inlets. Surrounding uplands contain potholes with fresh and saline wetlands.	National Wildlife Area (designation imminent), National Historic Site	Information kiosk, trails, viewing tower, auto tape tour, picnic site.

Quill Lakes

Big Quill Lake is Canada's largest saline lake. With Middle and Little Quill lakes, it lies in the aspen parkland vegetation zone, surrounded by rolling glacial moraines, with many smaller sloughs. Big Quill Lake is the site of a colony of some 500 pairs of White Pelicans and a major nesting place of the endangered Piping Plover. Many other shorebirds and waterfowl nest here.

The Quill Lakes are also used by large numbers of waterfowl and shorebirds on migration. Up to 85 000 geese have been recorded, chiefly Canada Geese, Lesser Snow Geese, and White-fronted Geese. Over 100 000 ducks and 12 000 Sandhill Cranes have been seen here in the fall.

Much of the area is controlled by the provincial government, but part is in private hands. Agricultural and industrial developments in the region could encroach on the lakes. Their designation as a Ramsar site has helped to keep those threats at a distance.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Quill Lakes 1987	Saskatchewan 51°55'N; 104°20'W.	63 500	Provincial, Private	Three distinct wetlands: Big Quill, Middle Quill and Little Quill lakes surrounded by rolling glacial moraine and sloughs. Big Quill Lake is Canada's largest inland saltwater lake.	International Biological Programme site	No visitor facilities.

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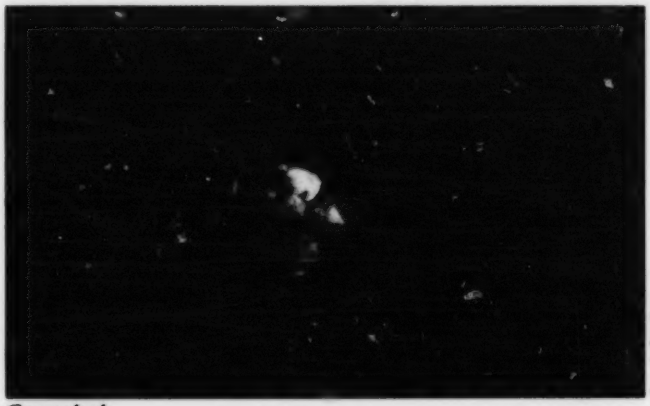
Delta Marsh

The Delta Marsh, a series of bays and sloughs along the south shore of Lake Manitoba, was one of the most famous duck-hunting areas in North America in the first half of the twentieth century, because of the very large numbers of ducks that stopped there in the fall. It is still a popular hunting area, and the numbers of ducks stopping there are still impressive enough to qualify the marsh as a Ramsar site, though they are only a fraction of what they were. The decline was due initially to a great reduction in prairie ducks in the 1930s as a result of widespread and prolonged drought, from which recovery was never complete. There was a further decline in the 1980s, when prolonged drought again affected the prairies. Meanwhile, the attractiveness of the marsh to ducks had been reduced by reclamation for farmland and by the installation of flood-control structures on the feeding rivers, with resulting changes in the water regime and the vegetation of the marsh.



Chuck Gordon

Canvasback

The only waterfowl that are now more numerous at Delta than they were in the past are geese. A local introduction of Canada Geese was very successful. Lesser Snow Geese, far more plentiful than formerly, now use the marsh and other sites in southern Manitoba as feeding places for building up reserves for migratory flights, both on their way to the Arctic in spring and while heading south in the autumn.

The marsh was especially famous for its diving ducks: Canvasbacks, Redheads, and Lesser Scaup. They still occur in large numbers in most years, as do Mallard, Gadwall, American Wigeon, and Northern Pintail.

Few ducks breed in the marsh itself, but many used to nest around the sloughs and along the ditches in the adjacent farmland. Some still do, but no longer in outstanding numbers.

Delta Marsh is also internationally famous as the site of the Delta Waterfowl Research Station, established by a private foundation in 1938. The station has trained generations of waterfowl biologists and been responsible for much of the best research on waterfowl and wetland habitat management in North America. A second research station, with a wider biological remit and operated by the University of Manitoba, has also provided much useful research on the local wetlands.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Delta Marsh 1982	Manitoba 50°05′N; 98°00′W.	23 000	Provincial, Private	Large marsh consisting of bays and sloughs at south end of Lake Manitoba.	–	Public access to provincial land only.

Oak Hammock Marsh

This provincial reserve consists of bog and marginal agricultural land restored as freshwater marsh. It is an important breeding and staging area, where more than 260 species of birds have been recorded. In the last 20 years it has become a major staging area for geese, in both spring and fall, the numbers of Canada Geese and Lesser Snow Geese together sometimes exceeding 100 000.

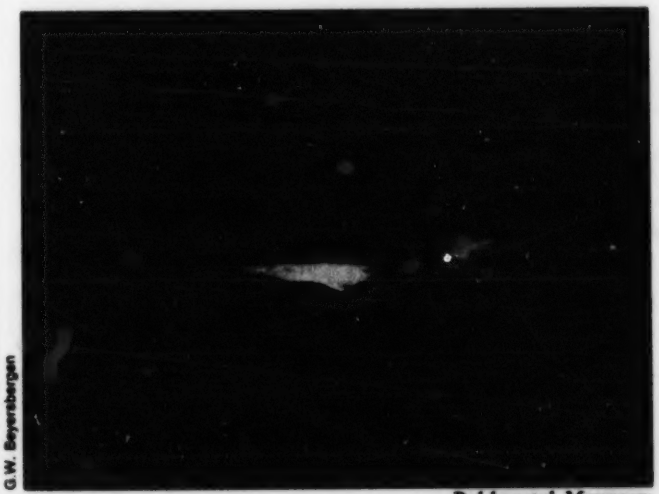
Oak Hammock Marsh is actively managed for wildlife, with a controlled hunting area. Being close to Winnipeg, the marsh is very popular with wildlife viewers as well as hunters. Urban and industrial development continues to enroach on the immediate neighbourhood, making the retention of the reserve of crucial importance in maintaining southern Manitoba a major stopping place for migrating waterfowl.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Oak Hammock Marsh 1987	Manitoba 50°10′N; 97°06′W.	3 600	Provincial	Bog and marginal agricultural land restored as freshwater marsh.	–	Visitor centre, viewing tower, boardwalk, picnic grounds.

Point Pelee National Park

Point Pelee is the southernmost tip of central Canada, a large old sandspit projecting into Lake Erie. It is the favourite haunt of migration-watchers, who assemble in large numbers in spring and fall, in the hope of finding themselves surrounded by migrants. About 350 species of birds have been recorded in the park. Masses of monarch butterflies also alight in the park on their southward migration.

Point Pelee's designation as a Ramsar site recognizes the importance of a large, deep freshwater marsh of some 850 ha and a series of shallow marshes between the sand ridges. Because of its southern location, these marshes are floristically unique in Canada. Several species of ducks and other waterbirds breed in the marshes, but it is the nearshore waters of Lake Erie that provide spectacular concentrations of migrating ducks. In most places mergansers are widely dispersed. Off Point Pelee there are often dense flocks of several hundred Red-breasted Mergansers, feeding by diving in unison, or flying low over the water.



G.W. Beyersbergen

Red-breasted Merganser

As a national park, Point Pelee is reasonably secure against "development." As part of a dynamic shoreline, it is subject to continual changes from the combined effects of fluctuating lake levels and storms.

- The heavy industrial pollution of Lake Erie is also a hazard, even though the only pollutants discharged in the immediate vicinity are in the form of agricultural runoff.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Point Pelee National Park 1987	Ontario 41°59′N; 82°30′W.	1 564	Federal	Sand dunes, sand plains, ridges, and troughs dominated by freshwater marsh.	–	Visitor centre, viewing tower, boardwalk, picnic grounds.

St. Clair National Wildlife Area

The St. Clair site is part of an extensive system of marshes that extends along the eastern shore of Lake St. Clair, which lies between Lake Huron and Lake Erie. The marshes are interspersed by a series of sandy beach ridges formed by wave action. The clay plains that surround the area are among the most fertile in Canada.

Chuck Gordon

Tundra Swans

The marshes and shallow water of Lake St. Clair provide one of the most important resting and feeding areas for migrating waterfowl in Canada south of James Bay. In the spring peak waterfowl numbers have been as high as 360 000 birds. In the fall nearly 150 000 ducks, geese, and swans have been present at one time. Over one-half of the eastern population, or nearly a quarter of the entire North American population, of Tundra Swans passes through the region in early spring. In the fall the region supports about 20 000 Canada Geese, over 100 000 Canvasbacks (18% of the world population), 60 000 Redheads (8%), and 40 000 Ring-necked Ducks.

Several factors contribute to the heavy use by waterfowl of the Lake St. Clair marshes. They are located on major traditional migration corridors. Being in the extreme southern part of Canada where the regional climate is moderate, the shoreline marshes usually freeze later in the fall and open earlier in the spring than do most Canadian marshes, enabling the waterfowl to stop over for lengthy periods, especially in the fall. In addition to feeding in the

marshes, many of the dabbling ducks, Canada Geese, and Tundra Swans use the waste grain found in adjacent fields.

There are also important marshes on the Michigan shore of Lake St. Clair, including a state refuge of 2700 ha. These marshes add to the attraction of the lake, by providing many more resources for waterfowl to use. The ducks shift frequently from one site to another, making it difficult to determine just how many are present at any one period, or how long individuals may stay.

Over 30 species of marsh-dependent birds breed in the National Wildlife Area, including American and Least bitterns, gallinules, and Virginia Rails. Several species of reptiles and amphibians are also present, some of which are rare or threatened, including the eastern fox snake and the spotted turtle.

Situated downstream from an oil refinery and not far from a major industrial complex, the Lake St. Clair marshes are threatened by many chemical contaminants, both in the air and in the water. The marshes are also threatened by further agricultural encroachment. However, the site included in the Ramsar list is federal crown land protected by the Canada Wildlife Act.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
St. Clair National Wildlife Area 1987	Ontario 42°22'N; 82°22'W.	244	Federal	Marshes and shallow water interspersed with sandy beach ridges.	–	Viewing tower, trails.

Long Point

Long Point is a long, slender sandspit with an east-west axis extending 32 km into Lake Erie. It is renowned for the abundance and diversity of waterfowl it supports during spring and fall migrations. The spit is always changing in shape because of the continuous transport and deposition of sediments through wind and wave action and the changing levels of Lake Erie.

Long Point is a unique combination of habitats: deep and shallow marshes, wet meadows, rush swales (depressions that are often wet), wooded swamps, beaches, sand dunes, grass-covered ridges, savannahs, woodlands, and tamarack-cedar ponds.

The moderating influence of Lake Erie and the southern location of Long Point have resulted in the development of unusual plant associations, with many species occurring at the extreme northern limit of their range. Six hundred and eighty-nine plants have been identified, of which 42 are rare in Ontario. Three have not been recorded elsewhere in Canada.

Long Point is one of Canada's major resting and feeding areas for waterfowl and other migratory birds during spring and fall migrations. It serves as a natural funnel, providing the first suitable area in Canada for northbound birds in the spring and the last for southbound birds in the fall.

Up to 30 000 Tundra Swans pass through the marshes during spring migration and a lesser number during the fall. During both spring and fall migration more than 10% of the North American population of Redheads (over 700 000 in all) and Canvasbacks (about half a million) congregate in the Long Point area. Other diving ducks that pass through Long Point in spring and fall are the Ring-necked Duck, Greater and Lesser scaup, Bufflehead, and Common Goldeneye. The area is also one of southern Ontario's most important staging areas for Mallards and American Black Ducks.

Prothonotary Warbler

A large number of other birds use Long Point as a resting and feeding area before and after crossing Lake Erie in fall and spring. More than 330 species, or 75% of all the species recorded for Ontario, have been observed on the point. One hundred and thirty-eight species have nested, including some that are uncommon in Ontario, such as the King Rail, Forster's Tern, and the rare Prothonotary Warbler. Long Point is also a stopover for bats and large concentrations of monarch butterflies during their southward migration.

Twenty-six species of reptiles and amphibians occur in the Long Point area, including five species considered "threatened" in Canada. The marshes, ponds, and ridges of the peninsula provide them with extensive undisturbed refuges and breeding habitats. Long Point is one of the few known nesting areas in Canada for the eastern spiny softshell turtle and the queen snake.

Historical use of the area by man dates back to about 750 A.D., according to recent archaeological evidence. Much of what remains in its natural state today is due to the careful efforts of the Long Point Company, which has owned and managed about a quarter of Long Point since 1866, primarily for duck hunting. In 1980, part of Long Point was designated a National Wildlife Area.

Long Point's sandy soils are very vulnerable to disturbance. Wherever the protective cover of vegetation is removed, the underlying soils are exposed to erosion by wind and water. To reduce the risk of erosion, access to the area and the types of vehicles permitted have to be restricted. There are continuing pressures

for recreational development, particularly around Inner Bay, where more and more facilities for cottagers and boating are being promoted.

The Long Point Bird Observatory, a permanent research station near the top of the point maintained by a group of amateur and professional naturalists, has published many scientific studies on the migratory and banding bird populations. From 1960 to 1988 this group banded over 250 000 birds of 260 species.

In 1988 a Long Point Waterfowl and Wetlands Research Fund was established by the Bluff's Hunting Club, which has leased hunting rights at Long Point since 1919. The fund is intended to attract and support research aimed at better protection and management of wetlands in southern Ontario. The Ontario Ministry of Natural Resources, the Canadian Wildlife Service, and the Long Point Bird Observatory are represented on the management committee.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Long Point 1982	Ontario 42°35'N; 80°15'W.	13 730	Federal, Provincial, Private	Slender sandspit extending 32 km into Lake Erie with a variety of habitats including sand dunes, deep and shallow marshes, savannahs, and woodlands.	National Wildlife Area (3250 ha), Man and Biosphere Reserve, Provincial Park at western end	Visitor facilities and camping in Provincial Park; viewing tower and trails in Big Creek National Wildlife Area. Use of private and other federal lands restricted.

Southern James Bay Migratory Bird Sanctuaries

James Bay, a shallow extension of Hudson Bay at its southeastern corner, is one of the most important northern stopping places for migrating Arctic-breeding shorebirds and waterfowl, matched only by the Copper River Delta and Bristol Bay in Alaska and, for shorebirds only, by the upper Bay of Fundy. At the northwestern corner of James Bay, Polar Bear Provincial Park (described below) protects a major nesting colony of Lesser Snow Geese and other breeding birds. Farther south, extensive mudflats and coastal marshes on the Ontario shore of the bay provide massive resources of invertebrate animals which shorebirds can use to build up protein and fat reserves for long flights north in spring and south in fall. The areas of greatest value to shorebirds, north and south of the Albany River, have not yet been afforded any statutory protection, but fortunately are not under any immediate threat.

There are several long-established Migratory Bird Sanctuaries in southern James Bay, on Akimiski Island, at Boatswain Bay (on the Quebec shore), and at Hannah Bay and the Moose River, on the Ontario side of the provincial boundary. The Hannah Bay and the Moose River Migratory Bird Sanctuaries, a combination of mudflats, intertidal marsh, meadow marsh, fens, and bogs, have been declared a Ramsar site, primarily because of their role as a staging area in late fall for large numbers of Lesser Snow Geese (up to 75 000 at one time), Canada Geese, and dabbling ducks. The site also holds substantial numbers of diving ducks offshore, including scoters, scaup, and mergansers.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Southern James Bay Migratory Bird Sanctuaries 1987	Ontario 51°20′N; 79°31′W. and 51°20′N; 80°25′W.	25 290	Provincial	Mudflats, intertidal marsh, supertidal meadow marsh, fens, and bogs.	–	No visitor facilities.

Polar Bear Provincial Park

At 2.6 million ha, Polar Bear Provincial Park is the second largest Ramsar site in Canada. Lying within the coastal plain of Hudson and James bays, the site consist of a series of flat-topped beach ridges interspersed with ponds, bogs, fens, and marsh. Almost three-quarters of the park is covered by wet to saturated organic material or open water. The tundra in the northwest section of the park is the most southerly example in the world and contains plants typical of northern, even high Arctic, areas. During high tides, the coastal marshes and lagoons receive saltwater intrusions. The tidal flats vary from 1 to 5 km in width at low tide.

G.W. Beyersbergen

Hudsonian Godwit

Polar Bear Provincial Park regularly supports hundreds of thousands of ducks, geese, and swans. There is a breeding colony of over 50 000 pairs of Lesser Snow Geese at Cape Henrietta Maria, at the northeast corner of the park. During migration the entire Foxe Basin population of more than a million Lesser Snow Geese uses the marshes on the west coast of James Bay. All the small-bodied Canada Geese of the Tallgrass Prairie population (about 200 000), 50% of the Atlantic Brant population (100 000–150 000 in all), and many

thousands of Northern Pintail, American Black Ducks, and Green-winged Teal are believed to pass through the park.

The lowlands also support, during shorebird migration, a substantial proportion of the central Arctic population of Red Knot and the entire population of Hudsonian Godwit. Over 20 000 shorebirds have been counted within the park boundaries, and much larger numbers pass through, many of them staying only a few days.

Numerous species typical of Arctic areas have their southernmost breeding ranges in Polar Bear Provincial Park, including the Pacific Loon, Oldsquaw, Tundra Swan, Lesser Golden Plover, and Willow Ptarmigan, as well as the Lesser Snow Goose.

Polar bears, for which the park is named, use it as a summer resting area. In the spring, when the ice breaks up, the bears come ashore and congregate along the headlands, shoals, foreshore, and islands off the coast. Up to half of Ontario's polar bears spend the summer months in the area.

Polar Bear Provincial Park supports woodland caribou, moose, and a number of furbearers including beaver, muskrat, otter, and mink. The coast is visited by walrus, bearded seal, beluga, and an occasional narwhal.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Polar Bear Provincial Park 1987	Ontario 50°55′N; 87°00′W. 54°00′N; 82°15′W.	2 408 700	Provincial	Lies within coastal plain of Hudson and James bays. Flat-topped beach ridges interspersed with ponds, bogs, fens, and marsh. Most southerly tundra in the world.	–	Accessible only by air. Five zones where aircraft landing and camping are permitted.

Lac Saint-François National Wildlife Area

The St. Lawrence River was formerly fringed by marshes along much of its length. Many of them have been drained and reclaimed, or shut off by dikes built to prevent flooding or improve the navigability of the waterway. The marshes of Lac Saint-François, not far upstream from Montréal, form one of the largest remaining areas of shoreline marsh that have not been deliberately modified, although the hydrological regime of the river has been altered by the construction of the St Lawrence Seaway and, to an even greater extent, dams for the production of electric power, notably the Saunders Dam at Cornwall.

Freshwater marshes are usually more important as breeding places for other waterbirds than they are for nesting ducks. Lac Saint-François is

no exception, but holds small numbers of breeding Northern Pintail, Gadwall, and Redheads that are unusual in eastern Canada. (The Gadwall and Redheads have both arrived within the last 30 years and may have resulted from deliberate introductions of small numbers of each species into upper New York State.)

In the fall, Lac Saint-François is a major stopping place for migrating Redheads, Lesser Scaup, and the relatively scarce Greater Scaup, which is predominantly of eastern Canadian origin, while the other two come from the northwest.

The St. Lawrence Seaway is a busy shipping route, now kept open year-round. The passage of ships close to the Lac Saint-François National Wildlife Area leaves it constantly at risk of damage by spills of oil or other toxic pollutants. Fortunately, it has so far escaped serious damage.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Lac Saint-François National Wildlife Area 1987	Quebec 45°02′N; 74°29′W.	2 214	Federal	Large freshwater marsh and swamp.	—	Trail, viewing tower, information kiosk.

Cap Tourmente National Wildlife Area

Cap Tourmente was the first Canadian wetland to be included in the List of Wetlands of International Importance. Its tidal marshes and wet meadows are famous as the principal staging area, in spring and fall, for most of the world's Greater Snow Geese.

Michel Brazeilin

Greater Snow Geese

The Cap Tourmente site was acquired by the Government of Canada in 1969 and designated a National Wildlife Area in 1978. It consists of four physiographic units: intertidal marsh, coastal marsh, coastal plain, and plateau.

A striking feature of Cap Tourmente is the great diversity of plants. Nearly 700 different species have been identified. Cap Tourmente is the northernmost known site of many aquatic and terrestrial plants, several considered rare in Quebec and Canada.

The site protects the most important resting and feeding area for the Greater Snow Goose population during fall migration. Once endangered, this goose has made a comeback from an estimate of only 3000 birds at the turn of the century to its present-day population of 300 000. It breeds in the eastern high Arctic islands of Canada and winters on the U.S. Atlantic coast from New Jersey to North Carolina. During fall migration almost the entire population stops near Cap Tourmente to feed on grasses, sedges, and the rhizomes of the American bulrush that are buried in the mudflats. Up to 50 000 magnificent white geese can be seen at one time on the mudflats and marshes at the peak of the migration in October. Thousand of ducks also stop over at Cap Tourmente in the fall.

In March the geese leave their wintering grounds and head north to the St. Lawrence River, where they stay for 6–8 weeks before continuing on to their nesting area in late May. During spring migration the Greater Snow Geese do not congregate exclusively at Cap Tourmente, but use coastal marshes and grasslands along a 400-km stretch of the St. Lawrence River. As their numbers continue to increase, so does the area they need to feed themselves.

The lowlands of Cap Tourmente provide breeding areas for American Black Ducks, Mallards, Northern Pintail, Blue-winged Teal, Green-winged Teal, American Wigeons, Northern Shovelers, Wood Ducks, and many other birds, including such rare species as Peregrine Falcons and Sharp-tailed Sparrows. More than 250 bird species have been identified at Cap Tourmente.

Over 30 species of mammals live in or visit the area. Most commonly recorded are the muskrat, beaver, woodchuck, red fox, and snowshoe hare.

When Samuel de Champlain sailed up the St. Lawrence River in 1608, he named the promontory overlooking the site Cap de Tourmente (cape of torment) because stormy conditions would rise up with the slightest wind. In 1626, he built a dwelling and stable on the site now occupied by the "Maison de la faune," the headquarters of the Cap Tourmente National Wildlife Area. The National Wildlife Area attracts over 100 000 visitors each year, many of them during the fall migration period when spectacular flocks of Greater Snow Geese concentrate there.

Because Cap Tourmente is situated near the downstream end of the densely inhabited and highly industrialized St. Lawrence River valley, environmental pollutants (both in the air and in the water) are a continuing threat to the wildlife and habitat of the area.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Cap Tourmente National Wildlife Area 1981	Quebec 47°04′N; 70°48′W.	2 230	Federal	Intertidal marsh, coastal marsh, coastal plains, and mixed-forest plateau along north shore of St. Lawrence River.	–	Two visitor centres, interpretation program, trails. Controlled hunting.

Baie de L'Isle-Verte National Wildlife Area

Most of the marshes along the south shore of the estuary of the St. Lawrence River have been reclaimed for growing hay or grazing stock. (The local climate is too severe for cereal-growing or more intensive farming.) Part of the National Wildlife Area at Baie de L'Isle-Verte is coastal meadow that has been "improved," but it is the large intertidal marsh that is most important for wildlife. The breeding populations of American Black Ducks, the subject of an important long-term research project, and the Common Eiders that breed on nearby offshore islands both raise their young in the intertidal and tidal zones of the National Wildlife Area.

The site is a stopping place for considerable numbers of migrating Canada Geese, Greater Snow Geese, Atlantic Brant, and ducks, especially in the spring. The numbers seen are much smaller than in many staging areas farther west, but it is important to look after representatives of the waterfowl stocks of eastern Canada, many of which face relatively harsh conditions for much of the year.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Baie de L'Isle-Verte National Wildlife Area 1987	Quebec 48°01'N; 69°20'W.	1 927	Federal, Provincial	Large intertidal marsh; coastal meadow.	—	Seasonal visitor centre and interpretation program, trails, information kiosk.

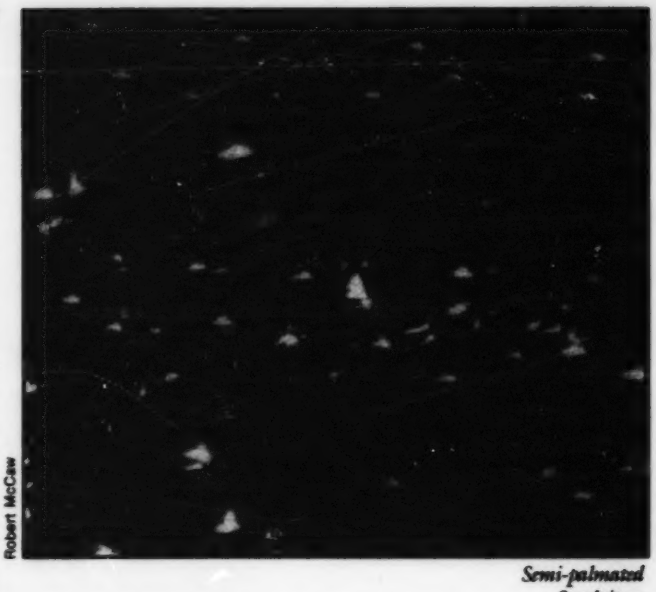
Shepody Bay and Mary's Point

The mudflats and tidal marshes at the head of the Bay of Fundy form one of the most important resting and feeding areas for shorebirds in eastern North America. Four Ramsar sites are located in the area. Shepody Bay and Mary's Point are so close together that it is convenient to treat them as one. In 1987 they were jointly designated the first Canadian Shorebird Reserve, part of the Western Hemisphere Shorebird Reserve Network. In March 1989, when a national reserve was established on the coast of Suriname, in northeastern South America, that reserve was formally twinned with Mary's Point.

The broad mudflats and gravel beach of Mary's Point attract a wide variety of shorebirds, with Semipalmated Sandpipers forming the great majority: over 200 000 may be present at one time in late summer. There is a large and fairly rapid turnover, so that the total number of sandpipers passing through between late July and early September may be several million. Mary's Point also attracts unusually large numbers of Least Sandpipers, Short-billed Dowitchers, Black-bellied Plovers, and Red Knots and smaller numbers of another 15 or more species.

The principal attraction of the area for shorebirds is the rich food supply in late summer, chiefly the presence of huge numbers of the mud shrimp *Corophium volutator*. The Bay of Fundy is the only place in North America where *Corophium* has been found, although it is widespread on mudflats on the European side of the Atlantic Ocean. The ability of Semi-palmated Sandpipers to assemble here at the season when mud shrimps are most plentiful is a reminder that the migratory movements of birds are often closely linked to the availability of exceptional sources of food. From the point of view of nature conservation, there is an obligation to ensure that these scarce treasure houses are not destroyed or damaged by human activities, because in most cases they are irreplaceable. If Semi-palmated Sandpipers were unable to take in stocks of protein and fat in the Bay of Fundy they could not make the long non-stop flight south over the Atlantic Ocean to Suriname and other havens on the north coast of South America.

There are large intertidal mudflats in other parts of Shepody Bay, also used by many shorebirds, with much shifting between sites, depending on the tidal cycle. The salt marshes around the bay support several hundred Canada Geese and American Black Ducks and smaller numbers of Green-winged Teal and Northern Pintail during the spring migration, but the most important passage of waterfowl in spring is of scoters and Common Eiders.



Robert McCaw

Semi-palmated Sandpipers at Mary's Point

Engineering studies have identified possible sites for tidal barrages at the head of the bay. Though they remain economically unattractive, this threat hangs over the future of Shepody Bay and Mary's Point.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Shepody Bay 1987	New Brunswick 45°47′N; 65°35′W.	12 200	Provincial	Large tidal bay at the head of the Bay of Fundy with vast intertidal mudflats as well as sand and gravel beaches and salt marsh.	Western Hemisphere Shorebird Reserve (with Mary's Point)	Abuts Mary's Point (observation deck). Visitor facilities at The Rocks Provincial Park.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Mary's Point 1982	New Brunswick 45°44′N; 64°45′W.	1 200	Federal, Provincial	Extensive intertidal mudflats, wide sand-gravel beach, and upland point with rocky reefs and associated salt marshes.	National Wildlife Area (107 ha), Western Hemisphere Shorebird Reserve (with Shepody Bay)	Observation deck, trail.

Chignecto National Wildlife Area

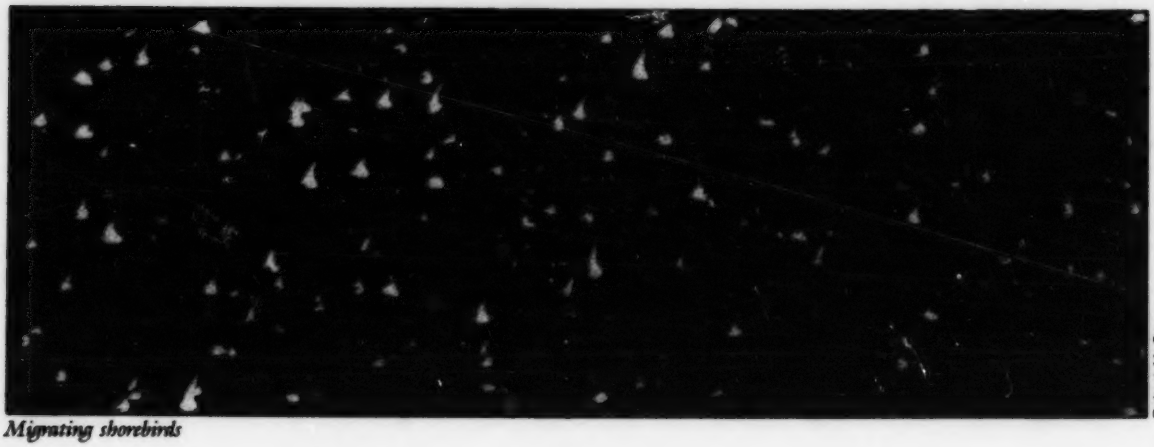
The Chignecto National Wildlife Area consists of 600 ha of salt marsh, intersected by many tidal creeks and channels, and over 400 ha of freshwater wetlands, ranging from sinkhole ponds to small lakes, including some impoundments. Without the spectacular concentrations of shorebirds in late summer that distinguish Mary's Point, lower down Chignecto Bay, this site is nevertheless important for waterfowl and other waterbirds, particularly in spring. On the salt marsh the most numerous species include Canada Geese (up to 6000), American Black Ducks, Green-winged Teal, and Northern Pintail. The freshwater wetlands hold breeding waterbirds, as well as passage migrants. Regionally rare species, such as Gadwall, Redhead, and Ruddy Duck, occur occasionally.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Chignecto National Wildlife Area 1985	Nova Scotia 45°48′N; 64°16′W.	1 020	Federal	Two different types of wetlands: 600-ha salt marsh intersected by numerous tidal creeks and channels; 420-ha freshwater wetlands.	Migratory Bird Sanctuary (433 ha)	Trails, observation decks.

Southern Bight-Minas Basin

This is a wide open bay surrounded by rolling uplands interspersed with salt marshes. There are extensive tidal flats, which attract large numbers of migrating shorebirds, including Semi-palmated Sandpipers, Semi-palmated Plovers, Black-bellied Plovers, Short-billed Dowitchers, and Least Sandpipers. In the spring and fall the bay is also used by many waterfowl, including Canada Geese, American Black Ducks, and Green-winged Teal.

The possibility of building one or more tidal barrages for the generation of electric power has been a potential threat to this and other areas in the upper Bay of Fundy for many years. So far the schemes have



Robert McCaw

Migrating shorebirds

not gone beyond the stage of engineering feasibility studies, because the costs of construction would be so high that the power would be expensive, even though the source is a perpetually renewable one. If a barrage is ever built, the Minas Basin seems to be the most likely site.

- How far, and in what ways, the consequential changes in hydrology and the deposition of silts would affect the invertebrate inhabitants of the mudflats it is very hard to guess, but it seems likely that an impoundment with flow channelled through turbines would result in lower biological productivity.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Southern Bight-Minas Basin 1987	Nova Scotia 45°13′N; 64°16′W.	26 800	Federal, Provincial, Not deeded	A wide, open bay surrounded by rolling upland interspersed with salt marshes. Extensive tidal flats.	National Wildlife Area (144 ha), Western Hamisphere Shorebird Reserve	Visitor facilities in Evangeline Beach Provincial Park.

Musquodoboit Harbour Outer Estuary

This provincially protected area consists of intertidal mudflats with scattered islands, behind a barrier beach sandspit. There are large beds of eelgrass (*Zostera*) in the intertidal zone, with many associated invertebrates. Both the eelgrass and the animals are important foods for waterfowl and shorebirds. The estuary is one of the chief coastal stopping places for migrating American Black Ducks and Atlantic Canada Geese; 2000–3000 Black Ducks and 4000–6000 Canada Geese also overwinter here. These are small numbers in relation to the total stocks of those two species. Yet it is important to ensure that the tradition of wintering in Canada persists and that these northern-wintering groups increase, so that the stocks are not wholly dependent on American wintering places, which are mostly subjected to heavier human pressures from disturbance and pollution.

Resident Bald Eagles are a special attraction here. The chief potential threat to this site is a natural one, the possibility that erosion will destroy the protecting sandbar.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Musquodoboit Harbour Outer Estuary 1987	Nova Scotia 44°42′N; 63°06′W.	1 925	Provincial, Private	Intertidal mudflats, scattered islands, substantial eelgrass beds. Coastal barrier beach sandspit.	Martinique Beach Provincial Park (60 ha), Martinique Beach Game Sanctuary	Visitor facilities in Provincial Park.

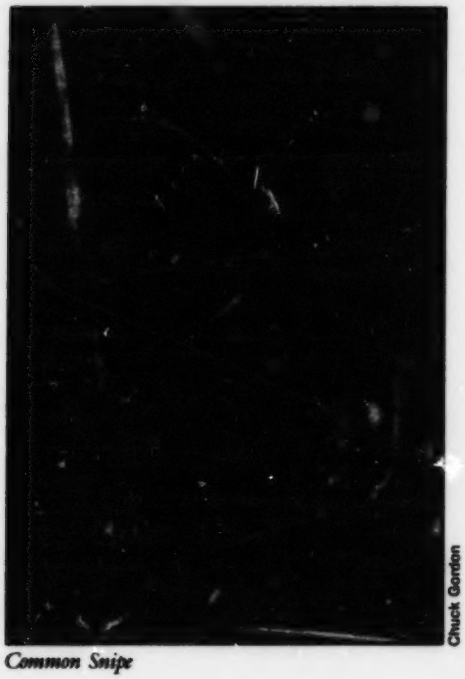
Malpeque Bay

The coastal and interior wetlands of Prince Edward Island, backed or surrounded by farmland mostly more fertile than the adjacent mainland, hold many waterfowl, in winter as well as on passage. The provincial reserve at Malpeque Bay is one of the best homes for waterfowl on the island. The numbers of Canada Geese using the island have increased greatly in the last 30 years. Up to 14 000 geese stop at Malpeque Bay in spring, and 20 000 in the fall.

- Peak numbers of ducks in fall include 3000 Red-breasted Mergansers, 1200 Greater Scaup, and 1500 American Black Ducks.

There are large nesting colonies of herons and cormorants, and many other waterbirds breed. The numbers of shorebirds in the bay have not been recorded in detail, as has been the case at several other sites on the island, but a wide variety of species is known to occur, some of them in abundance.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Malpeque Bay 1988	Prince Edward Island 46°32′N; 63°48′W.	24 440	Federal, Provincial, Private	Coastal lagoon protected from Gulf of St. Lawrence storms by long coastal sandspit and dunes.	Provincial wildlife management area (316 ha)	Public access to provincial land only. No visitor facilities.



Chuck Gordon

Common Snipe

Grand Codroy Estuary

The island of Newfoundland has many wetlands, but most of them are in the interior and of low biological productivity. The coast is predominantly rocky, with few estuaries. Grand Codroy, in the southwest, is one of the most productive. The estuary is protected from the sea by a long vegetated sandspit. There are extensive eelgrass (*Zostera*) beds on the intertidal flats. Here, as at other places on the Canadian Atlantic coast, Canada Geese are major feeders on Zostera, which is unusual farther south, where Brant replace them. Up to 3000 Canada Geese stop on the estuary in the fall, together with 1000 American Black Ducks and American Wigeon.

The Codroy area was one of the places where Leslie M. Tuck carried out his pioneering research on the Common Snipe in the 1950s and 1960s, and the snipe continues to be one of the characteristic birds of the marshes. Many other shorebirds use the mudflats, though they have not yet been studied intensively.

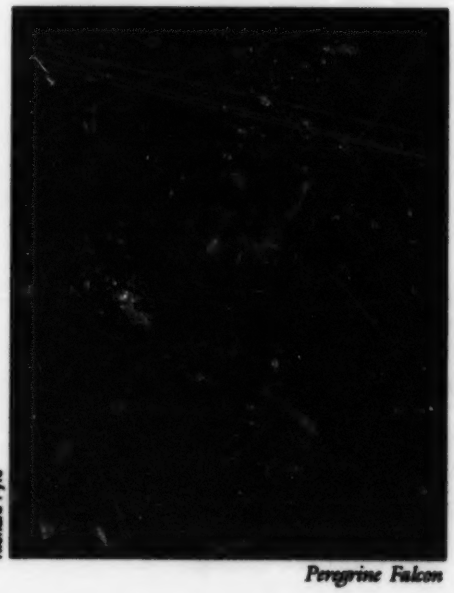
Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Grand Codroy Estuary 1987	Newfoundland 47°50′N; 50°18′W.	925	Provincial	Coastal estuary protected by long vegetated sandspit. Extensive eelgrass intertidal flats.	Provincial no-hunting area	Seasonal visitor centre.

Old Crow Flats

The Old Crow Flats site is a unique landform in the Yukon Territory: a vast plain dotted with more than 2000 shallow lakes and ponds. The waterbodies were formed by the melting of ice blocks into an ancient lake bottom. The Old Crow River and its tributaries wind through the flats. They are down-cut well below the general level of the plain, leaving most of the lakes perched. The flats are encircled by mountain and hill ranges on north, east, and south.

For such a northerly latitude (67° N), the productivity of the lakes and marshes is remarkably high. The marshes develop when the ice-rich lake margins erode and collapse, causing sudden water level changes. Usually a sedge marsh develops, followed by floating mats and eventually a shore-fast wet sedge beach.

The Old Crow Flats support from 200 000 to 300 000 waterfowl during the breeding season. Their numbers increase throughout the summer as birds arrive to moult, rest, and feed on the flats prior to fall migration. The predominant ducks are scaup, scoters, Oldsquaw, Northern Pintail, Green-winged Teal, and American Wigeon. The area also supports swans, loons, and grebes, though remarkably few geese. In years when there is drought on the prairies, some ducks, especially Northern Pintail, which normally nest in the south, move north early to spend the summer and moult before migrating south. Some come to the flats, while others go to Alaska and wetlands in the Mackenzie Basin. The *anatum* Peregrine Falcon, "endangered" nationally, also breeds in the area.



Richard Fyfe

Peregrine Falcon

The most important local economic value of the area is its muskrat population. An annual harvest of between 5000 and 10 000 is taken by the Gwitch'in people of Old Crow.

The Old Crow Flats and surrounding region hold some of the richest archeological sites in North America, with artifacts providing evidence of very early human habitation. The region was an unglaciated refugium during the last ice age; many Pleistocene remains provide evidence of a cool steppe environment at that time.

The area has been threatened by possible road construction and pipeline development. Some oil exploration has occurred, but the flats so far have remained very little affected by industrial activities.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Old Crow Flats 1982	Yukon Territory 67°34′N; 139°50′W.	617 000	Federal	Large postglacial lacustrine plain bordered by mountains on three sides and dotted with 2000+ shallow lakes and ponds.	–	Accessible only by air. No visitor facilities.

McConnell River Migratory Bird Sanctuary

A Migratory Bird Sanctuary was established to protect a large colony of Lesser Snow Geese breeding on the coastal marshes and inland wet meadows around the mouth of the McConnell River, south of the settlement of Eskimo Point, on the west shore of Hudson Bay. Considerable numbers of Canada Geese also breed here, with many ducks and shorebirds, though these have not been monitored as the geese have been.

Nearly 200 000 breeding pairs of Lesser Snow Geese have been recorded in the area; and after the hatch of young geese in a good breeding season, it was estimated that as many as 1.3 million geese were feeding in the vicinity, both along the coast to the north and south and moving inland. Families of geese may walk many kilometres inland as the goslings grow, searching continually for good grazing.

When the sanctuary was declared, nearly all the local geese bred within its boundaries. In the last 20 years or so more and more of them have spilled over into areas outside the sanctuary. In part this spread has been due to a general increase in the numbers of Lesser Snow Geese breeding in Arctic Canada. But, to a much greater extent, it has been a result of the geese depleting the resources of grasses and sedges within the sanctuary so that it can no longer support so many birds. The preferred food plants have almost disappeared from large tracts, although when wire enclosures have been erected to prevent grazing by geese, the vegetation

has rapidly re-emerged, because the bulk of most Arctic plants lies underground and can persist for many years, even when little is visible.

The tendency of geese to overexploit their resources, in an all-too-human fashion, has been more obvious at the McConnell River than at many other colonies, though it has also happened at the much smaller Lesser Snow Goose colony at La Perouse Bay, 230 km to the south. It is important to recognize the dynamic relationships between geese (and other herbivores) and the plants on which they depend. It would rarely, if ever, be practicable or sensible to discourage geese from using an area in order to allow the vegetation to recover from their overgrazing. The question raised at the McConnell River site, which has not yet been answered, is whether the correct response is to enlarge the boundaries of a sanctuary after the geese have expanded beyond it – perhaps to include areas not yet being used by the birds – or whether to accept the argument that, as the geese seem to be finding their own solutions, they should be allowed to do so without additional protection. In northern regions where human pressures are not at present important, that laissez faire response may well be adequate. In the south, where geese may be competing with farming and other human activities, they are likely to be in need of support from conservation organizations.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
McConnell River Migratory Bird Sanctuary	Northwest Territories 60°50′N; 94°20′W.	32 800	Federal	Extensive tidal flats and marshes along the coast and extending inland 3–8 km. Numerous lakes farther inland.	–	Accessible only by air. No visitor facilities.

Queen Maud Gulf Migratory Bird Sanctuary

The Queen Maud Gulf is Canada's largest Migratory Bird Sanctuary and largest Ramsar site: 6.3 million ha, or nearly as large as Ireland. The landscape is dominated by a generally flat plain that extends approximately 135 km south from the mainland shore of Queen Maud Gulf. Numerous lakes and ponds occur on the plain.

The vegetation consists of wet sedge meadows and marsh tundra in low-lying areas, interspersed with upland plant communities of lichens, mosses, and vascular plants.

G.W. Beyersbergen

Ross' Geese

The Queen Maud Gulf Migratory Bird Sanctuary was established in 1961 to protect what were then the only nesting grounds of Ross' Geese and resting and feeding grounds for the largest variety of geese in any single area in North America. Over 90% of the world population of Ross' Geese and 8 percent of the Canadian population of Lesser Snow Geese nest in colonies scattered throughout the sanctuary. In June 1988 there were about 178 000 Ross' Geese and 275 000 Lesser Snow Geese. In 1982 there had been 91 000 and 106 000, respectively. The sanctuary also supports smaller populations of nesting and moulting Canada Geese, White-fronted Geese, Atlantic and Black brant, and Tundra Swans. Most of the geese arrive at the site in late May, moult on the inland lakes and rivers, and leave the area in late August or early September.

Other wetland-dependent bird species found in the area include breeding Oldsquaw, King Eiders, Golden, Black-bellied and Semi-palmated plovers, several other shorebirds, gulls, and loons. The *tundrius* Peregrine Falcon, (classified as a "threatened" species in North America), is the third most common raptor in the area.

The sanctuary serves as the calving grounds for part of the Bathurst caribou herd (100 000 in 1988) and is home to about 10 000 muskoxen. Ringed seals live in the offshore waters.

In 1769 Samuel Hearne was the first white man to explore what is now this Ramsar site in his search for the Coppermine River. He first reported Ross' Goose in 1770 when he discovered large flocks near the Perry River. That nesting area remained unexplored until 1938, when Mr. Angus Gavin, a post manager for the Hudson's Bay Company, rediscovered it.

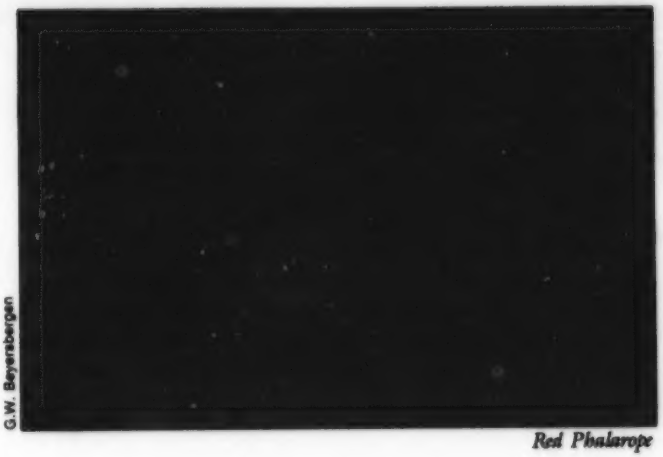
There are no known land-use conflicts in the area at present.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Queen Maud Gulf Migratory Bird Sanctuary 1982	Northwest Territories 67°00′N; 100°30′W.	6 278 200	Federal	Generally flat plain extending 135 km inland from Queen Maud Gulf. Lowland meadows and marsh tundra; hilly plains with numerous lakes and ponds.	–	Accessible only by air. No visitor facilities.

Dewey Soper Migratory Bird Sanctuary

The Dewey Soper Migratory Bird Sanctury is located on the Great Plain of the Koukdjuak, Baffin Island, in the Northwest Territories. The sanctuary, which occupies an area of 815 900 ha, is an extensive sedge lowland bordering the south-eastern shores of Foxe Basin. Lack of relief on the plain and a large tidal range in the basin combine to form tidal flats that can extend up to 15 km at low water. The wide marshy plain, which is dotted with shallow round lakes and circular swamps, is drained by many small sluggish streams. Raised beaches 25–80 km inland provide the eastern boundary of the area.

The Great Plain of the Koukdjuak supports the largest goose colony in the world. During the moulting period, in July and August, more than one million geese, mainly Lesser Snow Geese, are dispersed across the plain. Up to 228 000 Lesser Snow Goose pairs, about one-third of the Canadian breeding population, have nested on the Great Plain in those recent years when the snow cover has cleared early in June. (In years when snow cover was prolonged, most notably in 1972, little or no nesting occurred.) Lesser Snow Geese begin to arrive at the site in mid- to late May and nest by mid-June. Following the hatch, in mid-July, the adults and young disperse, many of them to inland feeding areas. They begin to migrate south in early to mid-September.



G.W. Beyersbergen

Red Phalarope

Canada Geese, Atlantic Brant, Oldsquaw, and King Eiders are also abundant during the nesting season. Cape Dominion, the westernmost extension of the area, used to support a fifth or more of the 100 000–150 000 Brant that winter on the U.S. Atlantic coast, although the numbers present in July 1989 were much less than that. Several species of shorebirds, including large numbers of the Red Phalarope, also breed on the site. Many caribou frequent the sanctuary in summer before migrating to wintering habitat in north-northwest Baffin Island.

There are no known land-use or other human threats to the area at present.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Dewey Soper Migratory Bird Sanctuary 1982	Northwest Territories 66°10′N; 74°00′W.	815 900	Federal	Extensive sedge lowland on the Great Plain of the Koukdjuak bordering Foxe Basin. Vast tidal flats; marshy plain dotted with shallow lakes.	–	Accessible only by air. Access and land use permits required by non-natives. No visitor facilities.

Rasmussen Lowlands

Very little was known about the wetlands and wildlife of the Rasmussen Lowlands until the early 1970s when surveys along a possible route for a gas pipeline south from Somerset Island and the Boothia Peninsula drew attention to their importance. This flat, poorly drained area emerged from the sea comparatively recently, as the icesheets of the last glaciation retreated northwards. The lowlands contain very many small lakes and ponds. These make the area particularly attractive to Tundra Swans: about 6% of the Canadian population bred there in 1976.

Large and increasing numbers of White-fronted and Lesser Snow geese also summer in the area, though no major breeding colonies are known here. A rough estimate suggests that half a million shorebirds may occur in summer: more detailed investigations are needed, because this may well be the principal breeding stronghold of several species. (Much less is known about the breeding distribution of shorebirds and ducks in the Arctic than about geese.)

Though the Polar Gas Project first drew attention to the Rasmussen Lowlands, it now seems unlikely that a pipeline will be built across them. Few other parts of the Arctic can be under so little pressure from human activities.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Rasmussen Lowlands 1982	Northwest Territories 68°40′N; 93°00′W.	300 000	Federal	An area of recent marine emergence, flat and poorly drained. Large number of small lakes and ponds throughout the area.	–	Accessible only by air. Access and land use permits required by non-natives. No visitor facilities.

G.W. Beyersbergen

King Eider

Polar Bear Pass National Wildlife Area

Polar Bear Pass is a wetland oasis in the dry high Arctic. Located on Bathurst Island, Northwest Territories, the site occupies an area of 262 000 ha between Goodsir Inlet to the east and Bracebridge Inlet to the west.

The pass, bordered on the north and south by rounded hills of limestone and sandstone, is a valley 5 km wide and 20 km long. The floor of the valley is dotted with numerous lakes and tundra ponds surrounded by meadows that are rich by Arctic standards.

The onset of thaw, in early June in normal years, combines with the nutrient-rich soils in low-lying areas to produce a lush wet meadow of grasses and sedges, interspersed with mosses, lichens, and flowering plants. More than 65 species of flowering plants, 182 lichens, and 112 mosses have been identified on the site. Spring melt helps to release overwintering insects that provide a major source of food for shorebirds such as Red Knots, Black-bellied Plovers, Sanderlings, and other species. Many of these breeding shorebirds winter in western Europe and North Africa, rather than in the Western Hemisphere.

Fifty-four species of birds have been recorded at Polar Bear Pass, 30 of which are known to nest. They include the King Eider, Oldsquaw, Red-throated Loon, Greater Snow Goose, Atlantic Brant, Rock Ptarmigan, Snowy Owl, Glaucous Gull, and three species of jaegers. Brant, Greater Snow Geese, and other species may not nest if the thaw is delayed. Polar Bear Pass is also an important resting and feeding area for several species before they move to their resting grounds in the spring or begin their southward migration. Early migrant geese arrive about the last week of May, and fall migration starts about mid-August.

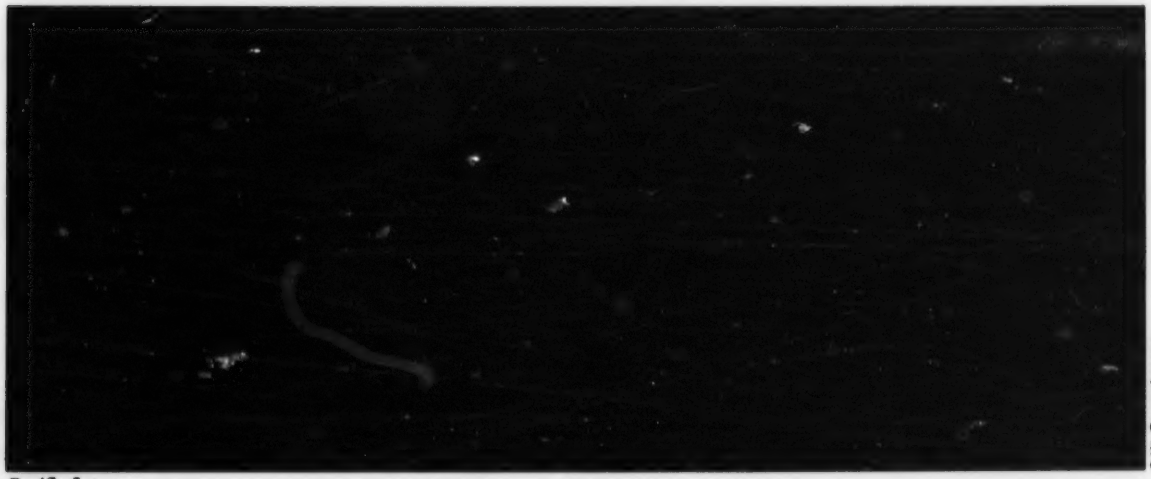
The Atlantic Brant that nest on Bathurst Island and elsewhere in the eastern Queen Elizabeth Islands winter in Ireland, migrating through Iceland and northwest Scotland. In 1989, by agreement with the governments of Northern Ireland and Ireland, Polar Bear Pass National Wildlife Area was twinned with nature reserves at Strangford Lough, south of Belfast, and in Dublin Bay. It is strange to see geese that have bred in this remote place swimming unconcernedly a few metres from Dubliners walking with their children and dogs along the shore.

The pass takes its name from the polar bears that travel through the valley from March to November, with peak numbers occurring in August and September. Muskoxen occur in the pass in greater numbers than anywhere else on Bathurst Island. The Arctic wolf, Arctic hare, and Peary caribou also inhabit the pass. The caribou population, once large enough to support an annual harvest by the Inuit of Resolute Bay, has seriously declined in numbers and is now considered "threatened." The Arctic fox is numerous in most years, particularly when the population of varying lemmings is at a peak. Ringed seals and walrus occur in the offshore waters. The latter use the Brooman Peninsula as a haul-out area.

Name and Year Established	Location (lat.-long.)	Area (hectares)	Land Ownership	Site Description	Other Designations	Access/ Facilities
Polar Bear Pass National Wildlife Area 1982	Northwest Territories 75°43′N; 98°40′W.	262 400	Federal	A 20-km-long valley dotted with numerous lakes and tundra ponds surrounded by rich meadows.	–	Accessible only by air. Access and land use permits required by non-natives. No visitor facilities.

Canada and International Wetland Conservation

The Canadian government has demonstrated interest in the conservation of wetlands worldwide in many ways, in addition to signing the Ramsar Convention. Earlier, Canada had become a national member of the International Waterfowl and Wetlands Research Bureau (IWRB). In 1982 the Canadian Wildlife Service hosted an IWRB meeting in Edmonton, Alberta, that gave momentum to wetland conservation in the Western Hemisphere by bringing together scientists and administrators from many countries to discuss how to work together in identifying the most important wetlands, which of them were most threatened and how best to ensure their future. The published proceedings of that meeting contain much valuable information. The Canadian Wildlife Service was one of the sponsors of a major investigation that was first planned in Edmonton and which led to the publication in 1986 of *A Directory of Neotropical Wetlands* (edited by D.A. Scott and M. Carbonell and published jointly by the IWRB and IUCN, the International Union for Conservation of Nature and Natural Resources) with financial help from several other agencies, including the Canadian Wildlife Service. The directory was a pioneering effort. Much additional information about wetlands in the Caribbean, Central and South America has been collected since 1986. Even more importantly, much has been done to protect wetlands in many countries in the region.



G.W. Beyersbergen

Pacific Loons, found on large tundra lakes

Another Canadian initiative that is helping to protect wetlands was a proposal to create a Western Hemisphere Shorebird Reserve Network, linking together sites in different countries used by large numbers of shorebirds. The Canadian Wildlife Service joined several other government agencies and non-government organizations in promoting this network, which includes the Ramsar sites at Mary's Point, New Brunswick, and Southern Bight-Minas

Basin, Nova Scotia. In 1989 a Canadian became chairman of the council overseeing the growth and maintenance of the network, which uses a "twinning" procedure that has captured the imagination of people in a rapidly growing number of countries.

In June, 1987, Canada was host to the Third Meeting of the Parties to the Ramsar Convention, which was held in Regina, Saskatchewan. The most important achievement of that meeting was that the parties agreed to provide funding for a permanent secretariat, to ensure the promotion and implementation of the convention. Much was done at Regina to improve the definition of what makes a site worthy of international recognition. That is not just a matter of bureaucratic interest. It is of crucial importance, especially in less-developed countries, to ensure that the criteria do not discourage wetland preservation by imposing conditions that cannot be met in places where human uses of wetlands for subsistence have to be continued.

Since the Regina Conference, Canada has continued to assist the working of the Ramsar Convention. The Latin American Program of the Canadian Wildlife Service supports research, education, and training in wetland conservation in other countries and encourages Canadian development agencies to take account of the need for wetland conservation in projects supported by them.

Although the listing of Wetlands of International Importance has so far been seen as the principal purpose of the Ramsar Convention, the convention has a larger aim — the conservation of wetlands in general. The protection of large sites is certainly important. Yet in the long run it will be the way in which people care for the countryside at large that will determine both whether wildlife can flourish and whether people can live in harmony with the natural world. Canada has many natural advantages, of which its large store of the world's wetlands is one. Canadians have much to do to ensure that this heritage is cared for as it should be.

For More Information on Specific Ramsar Sites

Additional documentation is available for some Ramsar sites, particularly those that are also a Migratory Bird Sanctuary, National Wildlife Area, provincial park, or national park. Contact the appropriate provincial government, the Canadian Parks Service, or regional offices of the Canadian Wildlife Service.

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